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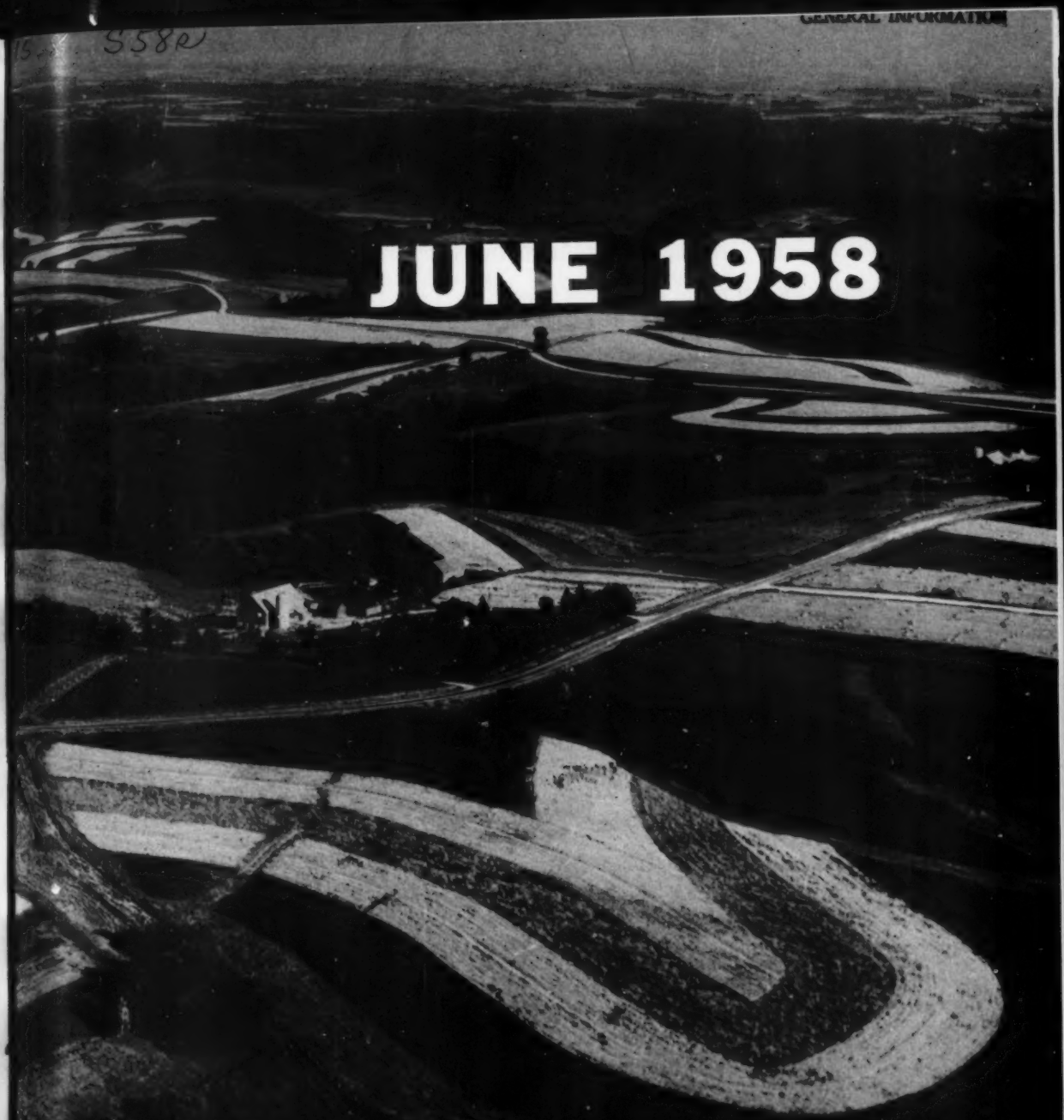

JUNE 1958

SOIL CONSERVATION

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SOIL CONSERVATION

JUNE—1958

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EZRA TAFT BENSON
SECRETARY OF AGRICULTURE

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ADMINISTRATOR, SOIL CONSERVATION SERVICE

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★ THIS MONTH ★

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TOM DALE, Editor

SOIL CONSERVATION is published by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business. The printing of this publication has been approved by the Bureau of the Budget, July 18, 1955. SOIL CONSERVATION supplies information for workers of the Department of Agriculture and others engaged in soil conservation.

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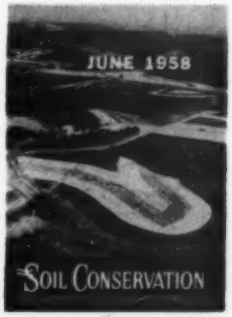
CONTRACTORS HELPED.—Dukes Soil Conservation District supervisors (Martha's Vineyard, Mass.) saw the need of land clearing with a brushcutting machine. But private contractors were not equipped with this type of machine and were reluctant to invest in one without knowing how much business they could count on.

So the supervisors bought a brushcutter for the use of district cooperators. It was put to work immediately and has been kept busy ever since. Recently, the supervisors sold the brushcutter to a local contractor. In the meantime, private contractors had bought five brushcutters of their own. The district had shown there was steady demand for this service. Now it has turned over all of this work to private contractors.

—EZRA SHAW

Editors are invited to reprint material originating in this magazine.



FRONT COVER. — Stripcropping patterns in Coon Valley, Wis.

Photo by E. Cole

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New Research For The Great Plains

Agricultural Research Service and Soil Conservation Service Scientists Discuss New Solutions for Old Problems at a Conference.

By TARLETON JENKINS

THE stocky man with the weather-tanned face finished his report and sat down. But Howard J. Haas, soil scientist on the Agricultural Research Service staff, at Mandan, N. Dak., did not get to rest long.

Questions popped from all sides. What would his findings mean in dollars per acre to the farmer? How large was the area involved? What were the findings in drier years?

It was evident that Haas had touched on a subject in which many of his listeners were interested. He was reporting, in Denver in February 1958, on his study of the practice of fallowing land in growing wheat on the Northern Great Plains.

A majority of the audience were technical men of the Soil Conservation Service. They were joining their opposite numbers in the Agricultural Research Service for a discussion of research information that would help the SCS men in their soil- and water-conservation efforts in the Great Plains.

This was not the first of these joint ARS-SCS huddles to find answers to knotty problems the SCS men had encountered. In Chicago in 1956, and in Colorado Springs in 1957, they had tussled with problems involving the irrigation and drainage of land. And in Charleston, S. C., a conference had bored into the problems relating to too much salt in soils.

As in the other sessions, the SCS technical men had given the answer-hunters of ARS lists of questions concerning problems on which they needed help.

What Haas had said was substantially this: Farmers, in certain wheat and small grain producing sections of the Northern Plains, can use fertilizers in given amounts and make use of all of their cropland *every year*. It would mean putting protective plant cover on lands, which, under the present system of fallowing, leaves the land bare of protective residues much of the time. It would mean a more efficient system of farming—something that agricultural leaders in the whole Great Plains are now earnestly seeking for the entire area.

Haas was reporting on 3 years of experimenting with the use of nitrogen fertilizers in the cropping system of the area. He had found that fertilizer—preferably in 40-40 amounts of nitrogen and phosphate—had led to yields of wheat almost as good as wheat-following-fallow. Cost of the fertilizer, he said, was $9 an acre.

The practice would be most effective in years of normal or higher rainfall. In the years 1956-57, Haas had noted evidence of moisture shortage.

In wheat-following-corn, a 20–40 combination of fertilizer worked as well as wheat-following-fallow. The cost was about $6. The wheat yield was 26.9 bushels an acre.

What would this mean in cash to the farmer? Well, multiply the added yield by the price of wheat, and subtract the cost of the fertilizer and the other costs (above the expense of keeping weeds out of fallowed land) and the profits would be around $25 or $30 an acre.

Haas reported that studies in 14 States showed greater losses of fertility in the wheat-fallow system than in continuous small grains. And fallow, he pointed out, saves only about 20 percent of the moisture that is available during the season. The greater contribution of fallow is often the saving of soil nutrients. Therefore, if the nutrients can be added in fertilizer, fallow may be eliminated.

Note:—The author is information specialist, Soil Conservation Service, Denver, Colo.

Howard Haas of ARS is the focal point in a discussion on the use of fertilizers in wheat growing on the Northern Plains. Others in the group are: (left to right), T. L. Gaston, Ross Davies, L. G. Wolfe, W. F. Keller, E. H. Sandberg, and Cyril Luker.

At the North Platte Experiment Station in Nebraska, a study had been in progress for 9 years on the effect of residues and supplemental commercial fertilizer on winter wheat. Soil Scientist R. E. Ramig, reporting on results, stated:

"In the alternate wheat-fallow cropping system, there is a trend toward higher wheat yields where the residues are left on the soil surface by subtilling. Significant yield differences due to residue management, occurred only in 1953 and 1955, when yields were highest where the stubble had been subtilled . . .

"During the drouth year of 1955, wheat yielded 38 bushels where the stubble had been plowed, burned and plowed, or one-way disked, and 47 bushels where the stubble had been subtilled. This difference in yield resulted because the subtilled stubble had reduced runoff losses and stored more water in the soil during the fallow period. This additional stored water carried wheat on these plots through a drouth period, at heading time, when the other plots suffered drouth stress. Later, timely rains produced good wheat yields, but the drouth-damaged wheat on the burned and plowed, plowed, or one-way disked plots did not have the yield potential of the wheat on the subtilled plots.

"Nitrogen fertilizer has had little effect on wheat yields for any of the residue managements practiced in the alternate wheat-fallow system."

Results of an evaporation control study at Manhattan, Kans., were reported by Soil Scientist R. J. Hanks:

An excerpt: "We have been investigating the influence of a chemical waterproofing agent on evaporation. By the use of this chemical it is possible to eliminate liquid flow through the treated soil. The data show this method of evaporation control is effective in the laboratory.

"Tests . . . show that a soil mulch is much more effective in decreasing water vapor flow than gravel or straw mulches."

Soil Scientist J. J. Bond's report dealt with dryland-cropping practices. The tests he reported were at the Southwestern Great Plains Field Station near Amarillo, Tex.:

"More total wheat is produced with continuous cropping, but over a period of years the results show that a wheat-fallow rotation on a given number of acres will yield about 90 percent as much as continuous wheat. A wheat-fallow rotation compares very favorably with continuous wheat, when consideration is given to the seeding and harvesting expenses . . ."

At Big Spring, Tex., Soil Scientist Earl Burnett had been working on grass establishment:

"Generally speaking, the recommended procedure after seeding is to leave the seeding alone until heavy weed growth starts in the spring. Then it is possible to use a weak 2,4-D or 2,4-5-T spray for weed control . . . Experience has shown it is a desirable thing to do if a stand is desired . . . Since these chemicals have been available it has been possible at a number of stations to almost insure stands. Of course, there is some danger to the young seedling plants. However, when concentrations are relatively low, the damage is usually not severe."

From a report on the work of Soil Scientists B. W. Greb and A. L. Black at the USDA Central Great Plains Field Station at Akron, Colo.:

"The general effects of manure on crops grown continuously has been to increase grain yields under favorable moisture conditions and to decrease grain yields under unfavorable moisture conditions. There has been a general increase in straw and/or forage under both favorable and unfavorable moisture conditions under continuous cropping."

In the unending search for grasses for the Great Plains, George A. Rogler, ARS research agronomist, noted findings on the principal grasses on which the tests have been conducted, as follows:

Crested wheatgrass: Can be rated one of the most successful of the introduced grasses. Other grasses or legumes may be planted with it, but it should be the basis of the mixture. Nordan variety of Standard, developed at the Northern Great Plains Station and released in 1954, is superior in quality of seed and seedling vigor. Close correlation has been found between seed weight and seedling vigor.

Russian wildrye: Has proved its ability to survive drought. It has been more palatable during midsummer and fall than most seeded grasses. It makes rapid recovery after defoliation, even in summer, if moisture is available. Protein content of the leaves remains unusually high even at seed maturity. Seed supplies of Strain 2355 are being built up and are due for release soon—possibly this year (1958). Greatest improvement shown by this strain is in resistance to lodging and in seed production (75 percent above commercial).

Intermediate wheatgrass: Earlier recommendations have been over-optimistic, but when properly used in specific areas it is of great value. It is less hardy and drought resistant than crested wheatgrass and Russian wildrye. It tends to be short lived when grown on the borderline of adaptation. Gains per acre and dry-matter production declined as stands grew older. (Under equivalent conditions, stands of brome-alfalfa remained in excellent condition.)

Bromegrass: This introduced sod-forming grass is highly important to the areas in which

Charles J. Whitfield of ARS (at end of table) presides at a discussion on stubble mulching. Around the table (left to right) are: Earl Burnett, R. E. Ramig, and B. W. Greb of ARS, with Dolph Craig, Maurice Gamble, and Joe Turelle of SCS.

it is adapted. The southern types when grown in the north are more aggressive and form a denser turf than northern types, but they are lower in nutritive content. When mixed with alfalfa, they tend to reduce the alfalfa in the stand. Southern types will survive a more severe dry spell in the north than the northern types.

Green stipagrass: This is an improved variety of green needlegrass, a native perennial, cool-season bunchgrass. Seedlings resist soil blowing, grasshopper injury, and drought. Mature stands are well-adapted for pasture use because of high production and rapid recovery after defoliation. Seed is highly dormant and germinates only about 20 percent the first year. Older seed germinates on a larger scale.

Western wheatgrass: Seed production has not been very successful under cultivation. Stands have been difficult to establish under range conditions because of slow germination and seedling growth. Tests have shown mixtures of this grass with green needlegrass and blue grama to be outstanding.

Legumes: Alfalfa is the best perennial legume for reseeding purposes. Plantings of other exotic and domestic species have shown some to hold promise, but none has equalled alfalfa in performance. Most adapted varieties can maintain stands under grazing either when planted alone or with grass. Crested wheatgrass-alfalfa mixtures have proved somewhat more successful than brome-alfalfa mixtures.

Warm-season grasses: Local strains must be used and should not be moved farther than about 200 miles north or south. Among the northern Plain States, western Nebraska is the area in which these grasses can be best used. Promising strains for specific areas: Nebraska 27—sand lovegrass, Nebraska 28—switchgrass, and Butte sideoats grama. Blue grama and big and little bluestem can be recommended for some sites.

OUR FUTURE FOOD SUPPLY depends upon the intelligence with which we use our productive resources. That is why an intensified, nationwide program of conservation—wise use of our land and resources—is so essential. While solving today's problems, we must not neglect tomorrow's needs.

EZRA TAFT BENSON,
Secretary of Agriculture

Beavers Do The Job

Beavers Create Farm Ponds in Soil Considered Unsuitable for Man-made Ponds.

By E. WAYNE BRENN

IF Richard Hollister named his farm, in south Logan County, Kans., according to the view from his farmstead, he would probably call it "Pleasant Valley."

This name well describes what one sees looking down over a grass carpeted, tree-lined draw. But Hollister is quick to tell you that the view has not always been so pleasant. In fact, a great change has come about during the last 5 years. To anyone familiar with this area, the change is remarkable because these years include some of the driest on record in this locality.

What is the reason for this change? Hollister is ready with the answer when this question is asked. He will point out several clear, grass-lined ponds and say, "This is the work of my private engineers—the beavers."

The view is nice, but to Hollister, a practical-minded cattleman, the most important value of the ponds is the water supply that has been developed for his livestock. It is not uncommon in this vicinity to haul water for both household and livestock use since good water wells are hard to find.

In the summer of 1952, Mr. Hollister, a cooperator of the Logan County Soil Conservation District, requested help to find a location for a stockwater pond toward the north side of his pasture.

The watershed, that Soil Conservation Service technicians found, varied little from others in this area, except that cottonwood and willow trees grew in the draw from just below the farmstead to the upper reaches in the south.

Closer inspection showed several seep spots in the area where the trees were growing.

Note:—The author is work unit conservationist, Soil Conservation Service, Oakley, Kans.

Below the last seep by the farmstead, Hollister had constructed a small dam across the gully in the bottom of the draw to impound 3 or 4 feet of water. It was evident that almost every shower overtopped and damaged it severely. Maintenance was a continuous problem. From this dam north, the watercourse was dry.

Foundation investigations at the only suitable dam site in the north pasture showed deep gravelly, alluvial fill in the bottom of the draw. The estimated cost to construct an impervious core wall, to cut off underflow through the porous strata, was too high for Hollister, so he decided to abandon the project.

As the party of owner, contractor, and technicians assembled at the site broke up, someone suggested in jest that, "what this draw needs is a few beavers to build a string of dams and do maintenance after every rain."

The idea of beaver dams stayed with Hollister. In the fall of 1952, he obtained 3 beavers from the Kansas Forestry, Fish, and Game Commission and turned them loose by the small dam. Since then, the beavers have increased to 10. To date, they have built 12 ponds at different points, stretching about a half-mile north from the farmstead, thus giving a pretty good distribution of livestock water.

The small dams have raised the water table along the stream, and as a result, the bottom areas are covered with a lush growth of grass, wild flowers, willow, and cottonwood trees. With this rapid growth of plants, the area is developing into an ideal wildlife habitat. Hollister's son, Dick, says he is catching some nice pan fish from some of the ponds, as well as having good duck hunting in the fall.

Hollister advises that anyone interested in starting a project such as this should first familiarize himself with the habits of beavers. He believes that the most important thing of all is to have a good supply of food available because the beavers will move on if food becomes scarce.

Contrary to popular belief, beavers do not spend the winter sleeping, so they must have

A series of three closely spaced beaver ponds on the Hollister Ranch.

food the year around. During the autumn months, they gather green twigs and branches of willow and poplar and store them at the bottom of the pond in which their den is located. As they need food during the winter, they leave the den through an underwater exit and swim to the food supply below the ice.

In this region, it may be necessary to plant trees to maintain a continuous supply of food. It may also be necessary to protect some of the larger trees that should not be destroyed. Beavers are ambitious and will start gnawing on trees whether or not they are 2 inches or 2 feet in diameter. Some large trees on the Hollister farm are protected by wrapping the base with heavy hail screen.

Dick Hollister has operated his 2,320-acre farm since 1937. It is a full-time job managing 1,914 acres of grassland along with 406 acres of cropland, 220 acres of which is under pump irrigation. However, he realizes the beavers are giving him a much needed service and is willing to go to considerable effort to keep them working for him.

Hollister also makes other good conservation farming methods a part of his farming system. He says that his terraces and contour farming on cropland, along with good grassland management on his pastures, are paying dividends every year.

Dick Hollister ready for a duck hunt at one of his beaver ponds.

Multiflora Fences—

A Haven For Wildlife

By JERRY KRIEGER

MULTIFLORA rose fences, touted for their value as wildlife food and cover, got one of the best tests of their real value to wildlife during the 7 consecutive weeks that snow blanketed the ground of Berrien County, Mich., through January and February 1958.

And if the experiences of three Berrien County farmers with these "living fences" are typical, the multiflora rose is indeed a haven and blessing to wild creatures in the depths of winter.

Clarence Wirth of Three Oaks, who planted one of the earliest multiflora rose fences set out in Michigan, related how an immense flock of robins swarmed to three stretches of multiflora fence on his farm.

The flock finally built up to where Wirth thinks there were as many as 500 robins living on the red seed hips or berries. He and his son counted 70 cedar waxwings feeding there, too, in one flock. Eventually, the swarms of birds cleaned up the seed hips and the robins moved on.

In addition to some cardinals, mourning doves, and several other species of small birds, a couple of coveys of quail and a number of pheasants were daily visitors to the multiflora fences all through the stormy seige. Rabbits, too, ordinarily inhabit these fences, Wirth mentioned, although he did not pay any particular attention to what use they made of the fences during the long stretch of snow cover.

Robert Lyttle, who has about 240 rods of multiflora fence on his farm at the edge of Buchanan, told much the same story.

And Andrew Zech, Berrien Springs dairy farmer, who could watch the activity along much of his 1,000 feet of multiflora hedge from the windows of his home declared: "A multi-

Note:—The author is farm editor of the *News-Palladium*, Benton Harbor, Mich., and the *Herald-Press*, St. Joseph, Mich.

Andrew Zech near one of his multiflora rose hedges.

flora fence can't be beat for wildilfe in such weather."

A flock of about 300 robins built up to feed on the small seed-bearing berries along Lyttle's fence. They stayed about 3 weeks until the berries gave out. Cedar waxwings and other species of birds, he couldn't identify, also were drawn to the lifesaving supply of food. Several coveys of quail worked the hedges constantly and Lyttle noted pheasants at various times. Whether rabbits fed on the seed hips, Lyttle did not see, but he said rabbits are to be found along his fence all year long.

Not only does multiflora rose serve as a life-saver when all other food supplies are covered, but Lyttle said his fence has proven a great magnet for summer birds.

"The bird population here is 10 times as great as it used to be before I planted the fence."

Zech and his family enjoyed the long seige of snow if for no other reason than the good view they had from their home of the comings and goings of about 50 pheasants, several coveys of quail, and a varied assortment of small birds that plied their multiflora fence for food.

Questioned about some vague reports that multiflora rose tends to spread into fields where it is unwanted, all three men said they had found no particular difficulty with the plant spreading.

Wirth and Lyttle noted, too, that a multiflora fence does not reduce the growth of crops planted beside them. To the contrary, both said they have seen some of their best corn rows and largest wheat yields right next to the fences. Lyttle offered the explanation that the hedge traps a great deal of snow and creates an extra supply of moisture in the soil close along the fence. The roots of multiflora do not spread out to the sides, as other plants might, but are confined largely beneath the plants.

A GOOD TURN.—A New England culvert company recently received an order for farm pond pipe from a farmer of Brimfield, Mass. The company didn't know exactly what the farmer's needs were. It didn't want to saddle him with pipe he didn't need.

So the company referred the farmer's order to the Soil Conservation Service office in West Springfield. On behalf of the Hampden Soil Conservation District, an SCS technician called on the farmer. The farmer had thought of tapping a brook as a source of water for his pond. The technician suggested a bypass dug-out pond. The farmer accepted the suggestion. He dug an 8 foot deep, 70 by 70 foot pond. Now it's full. Tapping the brook wasn't needed. Neither was the pipe!

—HERMAN GOODELL

WEEDING HORTICULTURAL CROPS

No. 34

This is the thirty-fourth of a series of articles to appear from time to time in explanation of the various phases of research being conducted by the Department of Agriculture on problems of soil and water conservation.

By L. L. DANIELSON

EVERY phase of agriculture is benefiting directly or indirectly from new methods of weed control now available for practical field use. Growers of horticultural crops such as vegetables, fruits, nuts, and ornamentals are receiving a large share of these benefits because of the many serious weed problems in these crops.

Vegetable crops are grown on approximately 5.2 million acres and have a total annual gross value of about 1.4 billion dollars. A conservative estimate of the cost of weeds to the growers of these crops would be about 17 percent of their gross value, or an average of about 238 million dollars each year. Data on the acreages and values of the other horticultural crops are not as well documented, but the information available indicates that the losses due to weeds may be much higher in some of the small fruit and nursery crops. These high losses and the scarcity of hand labor have created critical economic problems in the production of many of these crops.

Losses caused by weeds are assessed on the basis of the cost of control, the loss of crop yield and quality due to weed competition, and damage to soil structure and other soil properties due to repeated cultivations.

The benefits of weed control take many forms in the different types of crops. For example, in seed production effective weed control in the field greatly reduces the cost of cleaning operations. Control of thistles in cannery peas eliminates the problem of separating the thistle buds from the peas in processing. The dissemination of weeds with nursery plants—a source of customer dissatisfaction—might be avoided. These are representative examples of the many benefits that may result from effective weed control.

Chemical methods of weed control are now available for a number of horticultural crops. Reference to a few of these herbicides and their uses will demonstrate the effectiveness of the weed control research program, to date,

Note:—The author is plant physiologist, crops research division, Agricultural Research Service, Beltsville, Md.

Spinach sprayed with herbicide immediately after planting in the two center beds. Outside beds are untreated: weeds are mainly chickweed and henbit.

Lima beans with pre-emergence spray of DNBP (right). Untreated plot (left).

and its promise for the future.

Orchard and vineyard weeds are often a harbor for insects, disease, and rodents, and as such they have been controlled with intensive cultivation until recently. Repeated cultivations, close to the trees and vines, however, caused severe damage to the roots of the crops, and in addition contributed materially to soil and fertility losses by erosion. Herbicides may now be used in place of cultivation for a number of the weed problems in these crops. DNBP (4,6-dinitro ortho secondary butylphenol) combined with oil, or combined with oil and CIPC [isopropyl N-(3-chlorophenyl) carbamate] controls many annual grasses and annual broadleaved weeds in vineyards and orchards.

The intensive cropping methods used in woody ornamental nurseries necessitates the careful control of weeds. In the past, extensive hand weeding and cultivation were required. Newly rooted cuttings may now be planted in soil previously treated with methyl bromide, and remain relatively weed free for an entire growing season.

Weeds in established nursery plantings of certain woody ornamentals can be controlled with CIPC or DNBP, separately or in combination, in granular form without injury to the crop. Species differ somewhat in their tolerance to these herbicides, and research data on this subject are being accumulated.

Ornamental bulb crops, such as gladioli, narcissi, tulips, lilies, and irises have presented particularly difficult weed problems, in connection with bulb or corm increase plantings, where small bulbs, cormels, or scales are planted, because they emerge simultaneously with annual grass seedlings. Pre-emergence applications of DNBP combined with post-emergence treatments with sesone have proved effective in controlling many of the annual grasses and broadleaved weeds in these crops.

Annual grasses and annual broadleaved weeds in blackberries and raspberries can be controlled with a combination of applications of DNBP, CIPC, or sesone (2,4-dichlorophenoxyethyl sulfate). DNBP and CIPC are used during the dormant period. Sesone applications are made during the growing season to kill the weeds as they germinate, and before they emerge.

Weed control in strawberries became an economic problem of such proportions in recent years that the acreage of the crop was seriously reduced. Increased acreages have accompanied the development of new chemical methods of weed control. Chickweed, henbit, and other winter annual weeds are controlled with a combination of CIPC and sesone applied at the end of the growing season. Volunteer small

Cantaloupes with pre-emergence spray of NPA (right). Untreated plot (left).

Gladioli sprayed with sesone (above). Untreated plot of gladioli (below).

grain seedlings from mulches are also controlled. Summer applications of sesone, at monthly intervals, controls annual grasses, and controls a large percentage of the annual broadleaved weeds prevalent in this crop.

A brief sampling of the chemical weed control methods in commercial use on vegetable crops will indicate the promise of weed control research in these crops. The herbicides and methods described in the following discussion have given practical control of the weeds usually prevalent in the respective crops.

Pre-emergence and lay-by applications of sesone are effective in Irish potatoes. Post-transplanting and lay-by applications of NPI (N-1-naphthyl phthalimide) are useful in sweet potatoes. Pre-emergence applications of CIPC or CDEC (2-chloroallyl diethyldithiocarbamate), and a combination of the two, have proved useful on a number of leaf, salad, and cole crops. Sprays of Stoddard solvent may be used on growing carrots, parsely, dill, and fennel. Beans and sweet corn may be treated with pre-emergence applications of DNBP. Cucumbers, cantaloupe, and watermelons are tolerant to NPA (N-1-naphthyl phthalamic acid) as a pre-emergence application.

These practical weed control methods developed to date by Federal, State, and industrial scientists indicate the possibilities for weed control research in the future.

Siphon Better Than Flume

Wyoming Farmers Find It Profitable to Install an $8,000 Siphon to Replace a Flume in Their Irrigation Canal

By AUBREY STANTON

WATER problems of 75 farmers who irrigate 8,500 acres in the Riverton Valley Irrigation District in Wyoming have been solved by the installation of an $8,000 siphon in the main canal.

The new siphon replaces an old flume, which was installed nearly 50 years ago. The flume had seen its best days and was about to fall down. According to Pete Stone, ditch rider, a flash flood which came down Haymaker Draw last August would have washed out the old flume, if it had still been in use—but now, the water goes through the siphon. The irrigation

Note:—The author is work unit conservationist, Soil Conservation Service, Riverton, Wyo.

Installing the siphon tube across Haymaker Draw.

district was fortunate in getting the siphon installed before this flash flood came.

During the winter of 1956–57, the board of directors met with a Soil Conservation Service engineer to decide whether it would be better to install another flume or a siphon. They decided a siphon would be better because floodwater coming down the draw would not be so apt to wash out a siphon as it would a flume. Too, there would be far less maintenance cost on a siphon. Designs were drawn and costs figured on both steel and concrete siphons. The directors decided a steel siphon, with concrete inlets and outlets, would be better.

Soil Conservation Service engineers designed the siphon. First step was to make a detailed survey. From this survey, the steel pipe for the siphon was designed, and the SCS engineers furnished plans for the inlet and outlet structures.

Construction began with excavation of the trench in which to lay the pipe. A dragline contractor did the excavation, placed the pipe, and did the backfilling. Each section of pipe weighed around 7,000 pounds. This was a lot of weight for the dragline to pick up and carry, and then lower in place. At times the dragline would tip up to the front portion of its tracks, but the pipe was put in place with right alignment and grade.

Removing trash from the inlet to the Haymaker siphon.

Pouring concrete for outlet structure for Haymaker siphon.

As the sections of pipe were placed, they were joined with dresser couplings to make the joints watertight.

After the pipe was placed and covered, work began on the inlet and outlet structures. About 31 cubic yards of concrete were used to pour the inlet and outlet structures.

Pete Stone, the ditch rider who had the big job of supervising installation of the siphon says: "The old flume was loaded when the ditch was full of water. It even ran over in a place or two. The siphon will pack twice as much water as the old flume."

Buttonclover In Tennessee

By C. H. JENT, JR.

IT is indeed a rare occasion for farmers and agricultural workers to find a wild plant with the versatile qualities of buttonclover. But, that is exactly what happened—buttonclover (Medicago orbicularis) was found growing wild near Lebanon, Tenn., in 1936. How it traveled from its native home in Europe to this location is apparently unknown. But there it was—growing and thriving—as if inviting someone to use it.

From this humble beginning, buttonclover has spread and is now used in many parts of the country. Observational plantings made by soil conservation district cooperators have encouraged this wider use of the plant. (Seed for many of the plantings was supplied by the Soil Conservation Service.) Hundreds of Tennessee farmers are presently using this winter legume in their farming programs.

Results of extensive research conducted by the Tennessee experiment stations along with farmer experience have pointed up many uses for buttonclover. And, who knows, perhaps we are overlooking other uses for this plant.

A dependable volunteering habit, after its crop has matured seed, enhances its value as a winter cover and green-manure crop. The thick mat of viney growth furnishes excellent ground cover for erosion control. Also, research results show that it provides one-third more vegetative matter to turn under than crimson clover and one-half more than vetch.

This legume is used in short rotations on cropland, sometimes in contour strips. Jerry Bratton, a cooperating farmer of the Hickman County Soil Conservation District, uses buttonclover in a 2-year contour strip rotation. The entire field is in clover each winter with every other strip plowed under for corn in the spring. A cash crop of seed is harvested from the remaining buttonclover strips. The corn strips are moved each year. This allows the clover to mature seed every other year and keeps a good stand volunteering back.

This same rotation is used in entire fields. W. B. Allen, Montgomery County farmer, grows his corn and tobacco in this cropping system. J. D. Fuller of Stewart County also uses this rotation on his burley tobacco land. A volunteering cover crop, leguminous green manure crop, plus a cash crop of seed are the principal qualities of this rotation.

Sheep, cattle, and hogs all relish buttonclover pasture. The Currey brothers and Allen Sloan, farmers in the Maury County Soil Conservation District, use the plant for supplemental winter and spring pasture. E. J. Chapman, superintendent of the Middle Tennessee Agricultural Experiment Station, provides buttonclover pasture for the experimental flock of sheep kept at the station.

"Buttonclover on the rocks" is the way William Hawks and Henry Denny of Wilson County use the plant. Many acres in the Central Basin of middle Tennessee are shallow limestone gladeland. Buttonclover will grow

Volunteer crop of buttonclover in a corn field in Montgomery, SCD, Tennessee.

Note:—The author is management agronomist, Soil Conservation Service, Columbia, Tenn.

Dairy cattle graze a buttonclover-oats pasture in the spring. The 10 acres of this pasture provided 812 cow days of grazing during April and May.

and reseed on this type of land when once established. The period of growth coincides with the season when there is ample moisture available.

As a winter legume in common bermudagrass pastures, buttonclover provides excellent spring forage as well as some nitrogen for the bermudagrass. C. P. Moore in Van Buren County has had the clover reseeding for 9 successive years in a bermudagrass pasture.

To get reseeding in bermudagrass or other perennial sods, some grazing must be done in summer months after the clover matures seed. This helps to get seed distributed and in contact with the soil so they can germinate.

On good level land, buttonclover and sudangrass or Starr millet work together to give supplemental winter and summer pasture. For most successful management two fields are used, or one field is divided so an early and late seeding of the summer pasture can be made. This allows clover to mature seed on land where late seeding is made. By alternating early and late seedings, the clover matures seed on all the land every 2 years. This keeps it coming back without use of any additional seed. Also, it encourages better grazing management for the sudan or millet.

Tommy Lowe, Wilson County dairy farmer, uses buttonclover and oats for silage. Lowe says that his dairy herd seems to accept the silage and produces as well on this as on alfalfa silage. Yields of from 8 to 15 tons of silage per acre have been reported.

This legume is used for hay, but it is rather difficult to cure properly. The addition of one of the small grains helps overcome this difficulty if the clover is to be cut for hay.

These are some of the ways buttonclover is being used in forage programs and cropping systems in Tennessee. Although this legume is not a "cure-all" or a "wonder plant", it does definitely have a place on many farms in its area of adaptation.

Winter cover crop of buttonclover in a cotton field.

Better Grazing

The Grass Got Better While Ranch Profits Increased When Soil, Water and Range Conservation Measures Were Adopted.

By TOMMY ELDER and HAROLD GOULD

TWO drouths—along with tips he picked up in between—taught Oklahoma rancher Dwight Ferguson some things about grass that have paid him well.

There are things he is sure it would be handy and profitable for other ranchers to know. For example, information about fencing and stock watering places, and rotating the use of pastures. And, how much grass can be used and still have it in condition for good use of a shower, when it comes.

The Ferguson place is in northwest Oklahoma, in the Woodward County Soil Conservation District.

Ferguson and his foreman, Cecil Bishop, shrug a little on remembering the drouth of the 1930's.

"It almost put us out of business," the rancher said. "We were long on cattle—like most of the other ranchers in the neighborhood—and short on grass. It was a day-to-day fight getting enough grass and feed to keep them."

They held on to as many cattle as they could, always hoping that the next year would bring more rain and grass.

"We were thinking in terms of numbers of cattle to make our recovery," Ferguson said. "We were figuring wrong. When the good years came, our comeback was slow. We never seemed to have enough grass. Even during World War II, when cattle prices and rainfall were both up, we still were not getting the returns we could reasonably expect. We started looking for some answers."

By comparison, the drouth years of 1952-56 were as rugged as any of the previous drouth in Ferguson's section. The ranch got only two-thirds of its normal rainfall. But other things were different this time.

"We had plenty of grass for our cattle," Ferguson reports with satisfaction. "We harvested grass seed every year and were ready for the next year of good rainfall.

Note:—The authors are area conservationist and work unit conservationist, respectively, of the Soil Conservation Service, Woodward, Okla.

Cattle grazing on bluestem, switchgrass, and Indiangrass pasture on the Ferguson ranch.

"The good rains came last year, in 1957, almost twice the normal. Our grass was ready for it. We harvested a bumper crop of grass seed, including 55,658 pounds of mixed grasses and 41,095 pounds of pure switchgrass. This came from 1,500 acres of range we had rested."

Ferguson says a decision he reached in 1947 was an important one in his ranching program. This was when he went to his soil conservation district for advice.

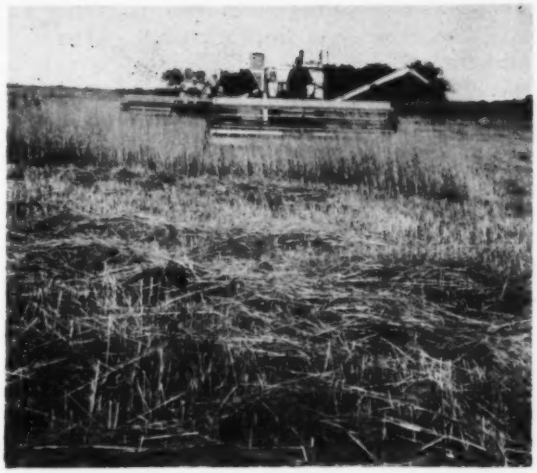
The district board of supervisors assigned a range conservationist from the Soil Conservation Service staff at Woodward to see what might be done. The SCS man helped make an inventory of the ranch resources along with an analysis of range-management practices being followed.

November scene on the Ferguson ranch. The pasture at left was grazed during the summer: the one at right is ready for winter use.

The ranch of 5,400 acres was divided at that time into 2 large pastures. The inventory showed there were high-producing bottomlands, relatively low-producing uplands, and overused areas along with underused areas—all in the same pastures.

Immediate recommendations were for 4 miles of cross-fencing, 3 windmills, and a temporary decrease in the number of breeding cows.

"We were hesitant at first about the fencing," Ferguson admitted. "It seemed this might be expensive in proportion to results. To our surprise this not only improved our grass production, but we figure the added convenience in handling our cattle paid for the fencing the first year."



Combines, operated by the soil conservation district, harvest native grass seed on the Ferguson ranch.

They later added 4 miles more of fencing, 4 other windmills, overseeded 263 acres of poor condition areas with native grasses, and seeded 137 acres of cropland to grass. They set out to control brush on 1,940 acres, and began resting parts of the range each year and using them for winter grazing.

By 1950, results were showing. Tall grasses such as sand bluestem, Indiangrass, switchgrass, and little bluestem began showing up in abundance. They began harvesting grass seed, a revenue source every year since. In fact,

Grass seed from the Ferguson ranch being sacked and weighed in the soil conservation district warehouse.

Ferguson reports the grass seed harvested has paid the expense of improvements. (The harvest for 1957 prorated to the entire 5,400 acres, meant an income from that source of $10 an acre.)

But without the grass seed, the results still would have been satisfactory to Ferguson and Bishop. Since 1947, they have increased the cowherd by one-third, or a total of 300 head. Most years they have more grass than they can use, and they have been able to carry part of the calves until the year following to collect added profit. Several times they have been able to buy and winter around 500 additional steers.

Another thing has been pleasing to Ferguson. Wildlife has done much better on the place. Quail have nearly always been plentiful but now there are wild turkey, too. And deer, prairie chicken, and pheasant are showing up in greater numbers.

Ferguson sums up what they have done this way:

"We have the emphasis here now on getting the land, with soil and moisture conservation, to produce its maximum of grass. We have adjusted our cattle numbers to correspond. This way you can stay in the cattle business. Any other way, it would be mighty doubtful, friend. Mighty doubtful!"

Ditch Lining Was The Answer

Wyoming Farmers Use a Homemade Slipform for Lining Irrigation Ditches With Concrete.

By GEORGE E. GOBLE

THE serious problem of delivering water to crops through seepy, rodent-infested irrigation ditches is being solved by soil conservation districts in the irrgated valleys of southeastern Wyomng.

Concrete ditch lining was the answer for these ditches; but, getting the lining into the ditch easily and economically presented problems.

Fred Sieck, typical irrigation farmer of Goshen County and board chairman of the Lingle-Ft. Laramie Soil Conservation District, puts it this way: "For years, all of us knew what should be done. We just didn't know how to do it."

It was true that Sieck and many of his neighbors had been carrying on a ditch lining program, with varying degrees of success for some time. They had learned that concrete lining was apparently the best method they could use to eliminate erosion and ditch maintenance costs, while conserving irrigation water and speeding its delivery to crops.

Prior to 1955, however, methods of installation varied considerably, and costs were excessive. The lining itself ranged from plastering the ditch with a thin membrane of concrete that lasted only a few years, to using elaborate portable forms and hand troweling it for the desired finish.

In many cases, satisfactory results were obtained. But, one serious disadvantage was always present; a lot of time, money, and hand labor was required to produce an acceptable job. This was true even in recent years when most of the concrete was delivered to the ditch by ready-mix concrete companies.

Sieck probably echoed the sentiments of all the irrigators in the area when he remarked that everyone was handicapped in using "horse and buggy" construction methods to produce a "jet propelled" irrigation system. The installation of more than 5,000 linear feet of lining, in the head ditches of his own farm, certainly qualified him to evaluate the practice. His proven records of 25 to 50 percent more available water for crops, as well as the elmination of ditch maintenance costs and rodent damage "sold" not only himself, but also most of his neighbors on the value of concrete lining. However, these antiquated construction methods and high initial costs generally discouraged a widespread acceptance of the practice.

By 1955, irrigation water shortages were becoming a serious problem in the area. It was evident that the lining program must be accelerated.

In several irrigated areas of the West, steel

Note:—The author is work unit conservationist, Soil Conservation Service, Lingle, Wyo.

Loading slipform hopper with ready-mixed concrete prior to installation of concrete ditch lining.

slipforms for the placement of lining in supply canals had been used with success. These were mostly expensive machines that were contractor owned and operated, and probably they would be too costly for an individual farmer to use in his own laterals. Could a smaller, less expensive version of the form be constructed? It would have to be a slipform that could be transported easily from farm to farm. An ordinary farm tractor would have to be capable of pulling it through the ditch. The crew needed for operating the form would necessarily have to be supplied by the farmers themselves.

Early in 1955, the North Platte Valley Soil Conservation District, one of three operating in Goshen County, decided that the possible gains of constructing a slipform were worth the gamble. With the aid of Soil Conservation Service technicians assigned to the district, a moderately priced form was designed for use in average-sized field supply ditches in the area.

Constructed in a local machine shop, and put into use more or less experimentally that

Placing concrete lining in a ditch with a slipform. Carpenter's level on the right determines when the slipform is plumb.

spring, the slipform proved entirely satisfactory. Even though the machine was manned by inexperienced crews, and pulled by ordinary farm tractors, ditches could be lined as rapidly as concrete could be delivered by ready-mix trucks. Installation of more than 2,000 linear feet of lining per day was not unusual.

Fred Sieck and his fellow soil conservation district supervisors, as well as supervisors from the South Goshen Soil Conservation District, watched the progress with keen interest. North Platte Valley District's gamble paid off.

In an effort to start the lining program on a countywide basis, and speed up the operation, a meeting of all interested groups and agencies was held in the fall of 1955. The three local soil conservation districts agreed to build additional slipforms on a cooperative basis. Forms would then be available to meet practically any ditch-lining situation that might arise. The County Agricultural Stabilization and Conservation Committee agreed to adjust incentive payments to make the practice more attractive to irrigators. Local ready-mix concrete companies agreed to obtain additional trucks and equipment to handle the expected demand for concrete.

A curing compound is applied with a hand sprayer to freshly poured concrete lining.

Fred Sieck trowels the freshly poured concrete to smooth out some rough spots.

During the winter, County Agricultural Agent B. H. Trierweiler and local newspapers publicized the value of the practice. With spring came the expected demand by district cooperators for SCS technical assistance in the planning and establishment of concrete ditch lining.

The operation functioned smoothly, and by the winter of 1956, soil conservation district records showed that a total of almost 200,000 linear feet of lining had been installed in Goshen County.

During 1957, ditch-lining operations not only continued in Goshen County, but several other southeastern Wyoming counties also put slipforms into operation.

NEW ENGLAND THRIFT.—Oliva Lahna of Westboro, Mass., does not like to see anything wasted. His Northeast Worcester County Soil Conservation District farm plan called for building a dam-type pond. The pond would cover a wooded area. Lahna didn't want to waste those trees. So he hired a wood chipper and turned the trees into mulch for his strawberries.

—GAYLAND E. FOLLEY

DISTRICT PROFILE

LYLE DICKMAN of FLORIDA

LYLE DICKMAN is a husky, six-footer, who looks as if he might be a pro football player enjoying a Florida vacation.

Instead, he's one of Florida's leading vegetable farmers and a businessman of acumen and sharp judgment. He grows sweet corn, lettuce, and cauliflower, which he markets intact. Such leafy vegetables as cabbage, escarole, and endive he processes as slaw and salad, in his own plant on the farm, and markets throughout the Southeast. He also packages spinach, mustard, collards, and kale. He raises cattle, and he's one of the leading lemon producers in the Nation.

As if all that didn't take up enough of his time and energy, he serves as chairman of the board of soil conservation district supervisors in the Hillsborough Soil Conservation District. And recently, he was appointed by Governor Collins to serve on the State Soil Conservation Board. He was also recipient of the Governor's Conservation Award as outstanding soil conservationist in Florida in 1957.

Mr. Dickman is keenly interested in the work of the district, with an intelligent understanding of the whole broad field of soil and water conservation—especially water conservation. And, he possesses a driving urge to do something about it. He attends every district meeting in the Hillsborough District besides area, State, and national meetings.

A good speaker, he appears regularly on farm programs on Tampa radio and television stations to discuss district work. He lends encouragement and, if necessary, material assistance to anything that will further the work of the district, such as school essay contests, banker-farmer awards, land judging, and so on.

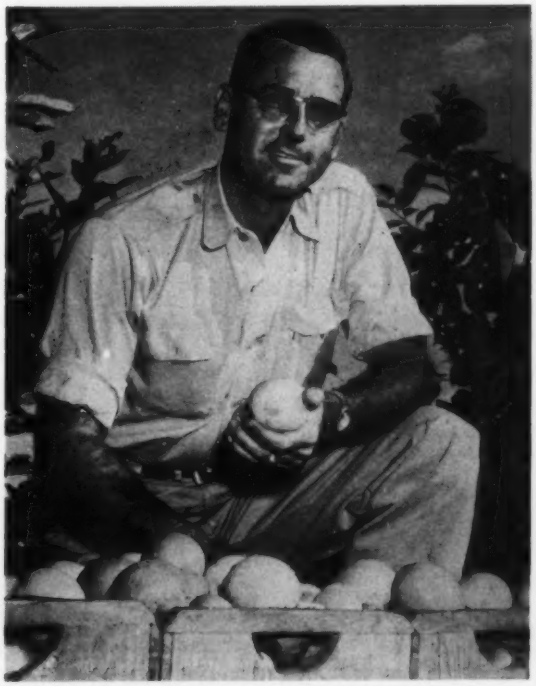
"There are 4,500 farmers in Hillsborough County," he pointed out, "and agriculture is still the backbone of our economy despite the phenomenal industrial growth that has taken place in Tampa and its environs.

"In view of this, it's simply good business to conserve soil and water resources—good business for the community as well as for individual farmers."

Lyle Dickman has one of the finest soil- and water-conservation programs on his farm that I have ever seen. His entire farm is operated under a soil conservation district plan; there isn't an acre on it that isn't completely protected by adequate conservation practices. As a matter of fact, it has been on maintenance for several years.

All his cultivated land is so ditched that it can be drained or irrigated with the same ditches. During the wet weather the ditches are used to drain off the excess water. During the dry season, water is fed into the ditches from artesian wells and the land watered by subsurface irrigation.

Other conservation practices that Mr. Dickman has established include windbreaks of Australian pine to protect his vegetable crops from blowing sand, and a long range grass-based rotation that he meticulously observes. After 6 to 7 years of producing vegetables, the fields are put in pangolagrass and used as pasture for 6 years.



Lyle Dickman displays some of his large lemons.

At the end of 6 years, Mr. Dickman turns under the grass in April or May, puts in an annual cover crop of sesbania or hairy indigo in June, and then in September, turns under the cover crop for vegetables. He then plants vegetables for another 6 or 7 years, or until the benefits of the perennial grass and cover crop have been expended.

"I cleared this land 15 years ago," he said. "At that time it was new land—had never been cultivated—and it made bumper crops. But today, it's better land than it was then, and will produce more than it would then, even with less fertilizer."

Lyle Dickman also owns the largest lemon grove in Florida, with 350 acres of trees. In 1957, he produced what he described as "a beautiful crop of good size and good weight." The lemons were as large as the average orange, and a box of 350 weighed 90 pounds.

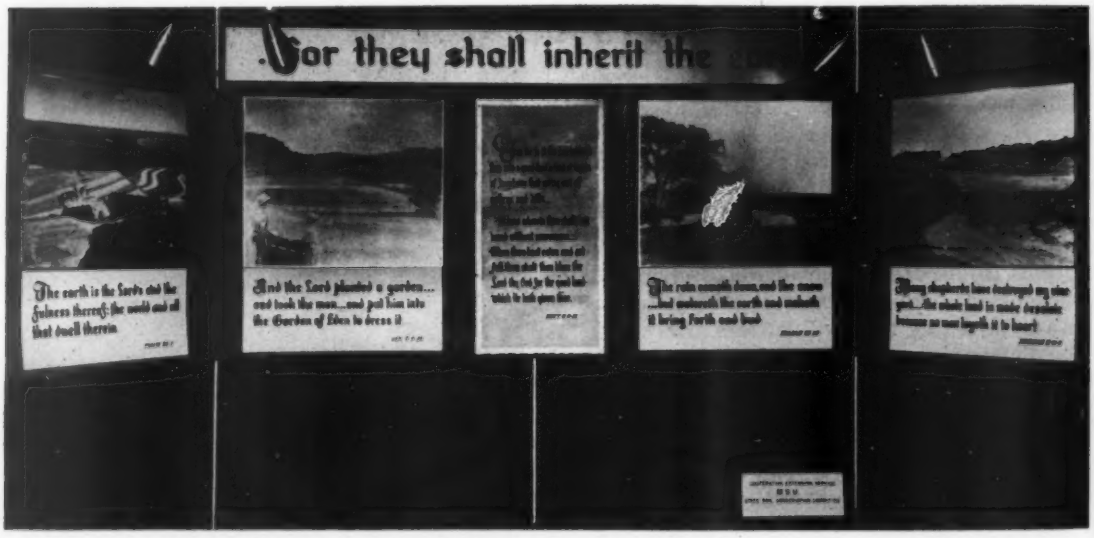
Another accomplishment that can be chalked up to Dickman's initiative and interest in public service is what is known on that part of the western coast as "The Tampa Bay Project." This involves converting that part of the Bay above the Courtney Campbell Causeway, connecting the cities of Tampa and Clearwater, into a freshwater lake.

This project had been discussed for a least 10 years but, until Dickman took hold of it and started the ball rolling, it was just a good subject for discussion at civic club meetings. Lyle Dickman got Governor Collins interested in the project and has kept the ball rolling since that time. Now the completion of the project is pretty much of a certainty.

Dickman is 37 years old, married, and the father of three sons. He is a graduate in agriculture of the University of Florida, class of 1942. Besides being chairman of the board of soil conservation district supervisors he also serves on the county ASC committee. He serves on those boards and committees because he feels that it is his duty to do so.

"It isn't enough for a farmer to conserve the soil on his own farm and stop with that," he says. "I feel that he has an obligation to work and to use his influence in obtaining the widespread application of conservation practices on all the land. Land is still our basic resource and, as long as it is, conservation will be of utmost importance."

—LEON J. SISK



CONSERVATION EXHIBIT.—This exhibit, displayed at 1958 Farmer's Week at Michigan State University is now available for use by county agents throughout the State.

DISTRICT PROFILE

TONY KREBS of SOUTH DAKOTA

THE conservation of soil and water plays a large role in the life of Tony Krebs of Quinn, S. Dak. He is not only an ardent conservationist on his own land, but devotes much time to conservation in his soil conservation district, in South Dakota, and in the Nation.

The control of wind erosion is of primary interest to Krebs. To accomplish this on his place, he uses a combination of stripcropping and stubble mulching. "Keeping the stubble on the top of the ground not only helps prevent wind erosion," says Krebs, "but it helps put more moisture in the ground and slows down evaporation." Of stripcropping he says, "Narrow strips of about 10 rods in width are needed on these highly erodible soils to do a satisfactory job of controlling wind erosion."

Tony is now starting a terrace system on one field and has plans for a small waterspreader system on some of his rangeland. He has recently established contour furrowing and pitting on 400 acres of rangeland and has planted about 7 acres of trees. Five acres have been planted in cooperation with the South Dakota Department of Game, Fish, and Parks for wildlife cover as well as for livestock protection. This planting will be expanded.

Krebs farms and grazes about 3,000 acres. He keeps about 100 head of Hereford cows as a breeding herd. In addition to the normal crops for his area, he raises grass seed for home use and market.

Range conservation is an important part of Krebs' operations and involves such practices as proper stocking and distribution of grazing with stockwater developments.

Tony won first place in his soil conservation district in the Greater South Dakota Association's Soil and Moisture Achievement Contest in 1956. The association paid his tuition for a short course in conservation at South Dakota State College as a result.

Krebs helped organize the Eastern Pennington Soil Conservation District in 1946, and has been chairman of its board of supervisors since its organization. He has been area vice president of the South Dakota Association of Soil Conservation Districts and a director of the National Association of Soil Conservation Districts. Recently he was elected as vice president for the National Association. His travels in these capacities cover the whole United States.

Tony Krebs.

Tony has an active partner in conservation. Mrs. Krebs is the Ladies Auxiliary treasurer of the South Dakota Association of Soil Conservation Districts. She also attends many meetings with Tony.

The Krebs are also active in many other community affairs. They both take an active part in the First Lutheran Church of Wall. Tony is president of the Pennington County Crop Improvement Association and vice president of the Golden West Telephone Association.

—KEITH HARNER

THEODORE ROOSEVELT, 1858-1958.—American conservationists, in 1958, honor this conservation-minded president on the centennial of his birth.

He fought the profiteers, land-grabbers, and wasters of the soil with much the same vigor he used in charging up San Juan Hill.

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"When the soil is gone, men must go, and the process does not take long." Even 50 years ago, our 26th president knew this, and tried to make sure, through law, that not only the land, but forests, water, and wildlife as well, would not be wasted—all would remain for future generations of the American public to enjoy.

He set aside more land—over 148 million acres, in our National Forests of today—than all other presidents combined. Due to his interest, a nationwide concern for conservation of forests, their management, and the beginning of the profession of forestry, came into being.

Today's National Park System and the National Monument Act were established during his administration, including Grand Canyon and Crater National Parks, and National Monuments, such as the Natural Bridge of Utah, and the Petrified Forest of Arizona.

His influence half a century ago at the Federal level in conserving the wildlife of America is reflected today in the growing action taken by individual States in wildlife management and protection.

In 1902, he signed the Reclamation Act that launched government into helping handle land, irrigation water, and hydroelectric problems in the rapidly developing West.

Against wasteful practices he said, "What has thus happened in northern China, what has happened in Central Asia, in Palestine, in North Africa, in parts of the Mediterranean countries of Europe will surely happen in our country if we do not exercise that wise forethought which should be one of the chief marks of any people calling itself civilized."

Fifty years ago this was true; and, it is just as true today.

—RUTH A. FRIES

CROP PRODUCTION IN THE SOUTH. By Glenn C. Klingman. 416 pp. Illustrated. 1957. New York: John Wiley & Sons, Inc. $4.95.

THIS text is written in a very clear, concise manner. It is primarily for high school and vocational agricultural instructors in their adult class work.

Nine chapters are devoted to the production of the major agricultural crops grown in the South. Each chapter is rather complete in discussing the importance, adaptation, crop needs, control of major insects and diseases, and harvesting methods.

Forages for pasture, hay, and silage and their importance in the South is treated in sufficient detail to explain where and how they can be used. A chart in the chapter shows when the major forage plants grow and the recommended time of seeding.

The author has discussed the subjects of how plants grow and the relationship of plants to soil. These two chapters form a good background for understanding the reasons for doing certain jobs at certain times in the later chapters.

At the end of each chapter a list of review and study questions are included. Answers to some are found in the text. Others can be answered by knowing certain facts, then applying the facts to the problem.

—B. D. BLAKELY

WATER: Our Most Valuable Natural Resource. By Ivah Green. 96 pp. Illustrated. 1958. New York: Coward-McCann Inc. $3.50.

THIS is another excellent booklet on water—its use and conservation. It is well-illustrated and written in a style appropriate for reading by fifth grade students or college graduates. It fully meets the standards of the other books and booklets written by Ivah Green.

—TOM DALE